



# Illinois Department of Transportation

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To: John Fortman Attn: District One  
From: John D. Baranzelli  
Subject: Pavement Design  
Date: April 29, 2013

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A handwritten signature, likely of John D. Baranzelli, written in black ink.

IL Route 31  
Kane County  
At Ferson Creek

We have reviewed the pavement design for the above captioned section, which was submitted to BDE on February 1, 2013. This project does not require alternate bidding. Life Cycle Cost Analysis favored a flexible pavement design as it is within 10%, and required the Pavement Selection Committee to convene. Minutes are attached to this memo.

The Pavement Selection Committee concurred with the design submitted by the district for the pavement. The approved pavement design is as follows:

IL 31 [Reconstruction]

- 10 inches of Full-Depth HMA Pavement
  - 2 inches Polymerized HMA Surface Course, Mix "F", N90
  - 2.25 inches Polymerized HMA Binder Course, IL-19.0, N90
  - 5.75 inches HMA Binder Course, IL-19.0, N90
- 12 inches Aggregate Subgrade Improvement

If you have any questions, please contact Paul Niedernhofer at (217) 524-1651.

## Pavement Selection Committee

March 28, 2013

BDE chaired the Pavement Selection Committee for two pavement designs from District 1. The following personnel represented the committee:

Jenpai Chang	District 1
Melchor Mangoba	District 1
Tim Kell	Construction
LaDonna Rowden	BMPR
Paul Niedernhofer	BDE

## IL 31 over Ferson Creek

This project will reconstruct IL 31 at Ferson Street to accommodate a new bridge. The project is not subject to the alternate bidding process because the project doesn't meet the 2 lane-mile length requirement.. The LCCA for this project favored the flexible design over a rigid design by 2.2%. Because the difference is less than 10%, the BDE Manual stipulates that the pavement selection will be chosen by a vote of the Pavement Selection Committee.

The district said there will be a 3-foot roadway grade raise for IL 31. The existing pavement and structure will be removed and replaced with stage construction. Mr. Kell stated that it may be easier to stage this project using a rigid design. The district prefers the flexible design because of the cost.

The rigid design option proposed to use 4.5" of stabilized sub-base in lieu of 4" policy thickness, due to cost savings. A subsequent series of emails from D-1 did not produce a satisfactory explanation of the cost savings.

On May 1, 2013, D-1 sent an email to the Pavement Selection Committee stating that the stabilized sub-base thickness will conform to the 4 inch standard thickness.

The committee favored the flexible design.

# Illinois Department of Transportation

# Memorandum

To: John D. Baranzelli

Attn: Paul Niedernhofer

From: Jose Dominguez

By: Melchor Mangoba/J.P. Chang

Subject: Pavement Analysis\*

Date: February 1, 2013

\*Route: FAU 3887 (IL 31)

Contract No: 60M81

Limits: At Ferson Creek

County: Kane

Section: I-B-1

Current target: 06CY13

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. The following is the scope of the project:

- a) Reconstruction of IL 31 at Ferson Street for a length of approximately 1,859 feet to accommodate a bridge reconstruction.

A 20-year pavement analysis was performed on the above segment. We recommend a mechanistic-flexible pavement design based on the life cycle cost analysis which favors HMA pavement by over 2%.

**a) IL Route 31 At Ferson Creek**

## HMA Shoulders

## Reconstruction

### Full Depth HMA

10" Full Depth HMA <sup>1.3</sup>

2" Polymerized HMA Surface Course, Mix "F", N90

2 1/4" Polymerized HMA Binder Course, IL-19.0, N90

5 3/4" HMA Binder Course, IL-19.0, N90

12" Aggregate Subgrade Improvement <sup>2</sup>

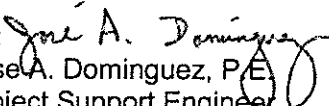
John D. Baranzelli  
February 1, 2013  
Page Two

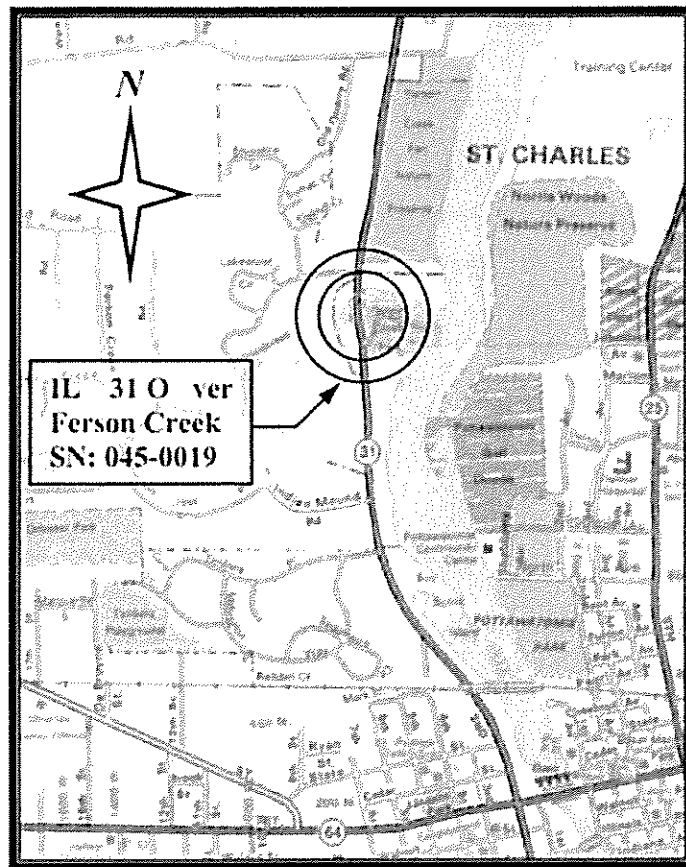
<sup>1</sup> Designer Note: Use pay item #40701881, "**HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 10" "**" paid for in square yards.

<sup>2</sup> Designer Note: Use pay item #30300112, "**AGGREGATE SUBGRADE IMPROVEMENT, 12" "**" paid for in square yards.

<sup>3</sup> Designer Note: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

If you have any questions or need additional information, please contact Jenpai Chang, Acting Pavement Design Engineer, at (847)705-4432.

By:   
Jose A. Dominguez, P.E.  
Project Support Engineer



## **Location Map**

### **Illinois Route 31 over Ferson Creek**

**County:** Kane

**Municipality:** St. Charles

**Township:** St. Charles

**Route:** FAU 3887

**Project #:** P-91-208-08

**Structure #:** 045-0019

## PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 31

Section: I-B-1

County: Kane

Location: at Person Creek

Comments:

Design Date: 01/31/2013 AS

Modify Date:

&lt;-- BY

&lt;-- BY

ADT

Year

Current:

13,800

2009

Future:

21,000

2030

Facility Type: Other Marked State Route

# of Lanes =

2 or 3

Part of future 4 lanes or more ?

No

One Way Street ?

No

Road Class:

II

Subgrade Support Rating (SSR):

Poor

Construction Year:

2013

Design Period (DP) =

20

years

## Structural Design Traffic

	Minimum ADT	Actual ADT	Actual % of Total ADT	% of ADT in Design Lane
PV =	0	17,447	93.8%	P = 50%
SU =	250	800	4.3%	S = 50%
MU =	750	353	1.9%	M = 50%
Struct. Design ADT =	18,600		(2023)	

## TRAFFIC FACTOR CALCULATION

## FLEXIBLE PAVEMENT

Cpv = 0.15

Csu = 112.06

Cmu = 385.44

TF flexible (Actual) = 2.28 (Actual ADT)

TF flexible (Min) = 3.17 (Min ADT Fig. 54-2.C)

## RIGID PAVEMENT

Cpv = 0.15

Csu = 135.78

Cmu = 567.21

TF rigid (Actual) = 3.12 (Actual ADT)

TF rigid (Min) = 4.59 (Min ADT Fig. 54-2.C)

## NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

## Full-Depth HMA Pavement

Use TF flexible = 3.17

PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)

HMA Mixture Temp. = 74.5 deg. F (Fig. 54-5.C)

Design HMA Mixture Modulus ( $E_{HMA}$ ) = 710 ksi (Fig. 54-5.D)Design HMA Strain ( $\epsilon_{HMA}$ ) = 86 (Fig. 54-5.E)

Full Depth HMA Design Thickness = 10.00 in. (Fig. 54-5.F)

Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.00 inches

## JPC Pavement

Use TF rigid = 4.59

Edge Support = Tied Shoulder or C.&amp;G.

Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

## CRC Pavement

Use TF rigid = 4.59

IBR value = 2

CRCP Thickness = 8.00 in. (Fig. 54-4.N)

TF MUST BE &gt; 60 FOR CRCP

## RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

## HMA Overlay of Rubblized PCC

Use TF flexible = 3.17

District = 3,4,5,6

HMA Overlay Design Thickness = 8.00 in. (Fig. 54-5.U)

## Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

## DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more	2 lanes with ADT > 2000	2 Lanes	2 Lanes
Part of a future 4 lanes or more	One way Street with ADT <= 3500	(ADT 750 -2000)	(ADT < 750)
One-way Streets with ADT > 3500			

Facility Type	Min. Str. Design Traffic (Fig 54-2.C)		
	PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%



**LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION****FULL-DEPTH HMA PAVEMENT**

Standard Design

ROUTE IL 31  
SECTION I-B-1  
COUNTY Kane  
LOCATION at Ferson Creek

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 1859 FT ==> 0.35 Miles  
# OF CENTERLINES 1 CL  
# OF LANES 2 LANES  
# OF EDGES 2 EP  
LANE WIDTH - AVERAGE 12 FT  
SHOULDER WIDTH HMA Inside 8 FT  
HMA Outside 8 FT

PAVEMENT THICKNESS (FLEXIBLE) 10.00 IN 14.50 IN MAX  
SHOULDER THICKNESS 8.00 IN HMA 30 Standard Design  
POLICY OVERLAY THICKNESS 2.25 IN

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.17	2.28	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$95.00 / TON
HMA TOP BINDER	\$90.00 / TON
HMA LOWER BINDER	\$85.00 / TON
HMA BINDER (LEVELING)	\$95.00 / TON
HMA SHOULDER	\$85.00 / TON

**INITIAL COSTS**

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.00")	4,957	SQ YD	\$51.02 / SQ YD	\$0
HMA SURFACE COURSE	(2.00")	4,957	SQ YD *	\$9.60 / SQ YD	\$47,590 ~
HMA TOP BINDER COURSE	(2.25")	4,957	SQ YD *	\$9.12 / SQ YD	\$45,211 ~
HMA LOWER BINDER COURSE	(5.75")	4,957	SQ YD *	\$22.01 / SQ YD	\$109,111 ~
HMA SHOULDER	(8.00")	3,305	SQ YD *	\$40.00 / SQ YD	\$132,196 ~
CURB & GUTTER		0	LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		88	TONS	\$25.00 / TON	\$2,200
IMPROVED SUBGRADE:	Aggregate	5,333	SQ YD *	\$10.00 / SQ YD	\$53,330
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		4,957	SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		3,305	SQ YD	\$0.00 / SQ YD	\$0

Note: \* Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST \$389,638  
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$45,135

**MAINTENANCE COSTS:**

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY \$0.00 LANE-MILE / YEAR			
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	\$9.60 / SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	\$10.80 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$7.20 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	\$3.60 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	\$10.80 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	\$9.60 / SQ YD
MILLING (2.00 IN)			\$2.50 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	\$90.83 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	\$89.71 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	\$90.83 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	\$89.71 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL			\$2.00 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane)			\$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST \$561,497  
FLEXIBLE TOTAL ANNUAL COST PER MILE \$65,044



FULL-DEPTH HMA PAVEMENT  
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT  
Figure 54-7.C  
STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
<b>YEAR 5</b>							
	LONG SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CNTR LINE JOINT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	RNDM / THRM CRACK R&S	50.00%	2,045	LIN FT	\$2.00	\$4,090	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$90.83	\$454	
	PWFn =	0.8626		PW =	0.8626 X	\$15,698	\$13,541
<b>YEAR 10</b>							
	LONG SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CNTR LINE JOINT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	RNDM / THRM CRACK R&S	50.00%	2,045	LIN FT	\$2.00	\$4,090	
	PD PVMT PATCH M&F SURF	0.50%	25	SQ YD	\$90.83	\$2,271	
	PWFn =	0.7441		PW =	0.7441 X	\$17,515	\$13,033
<b>YEAR 15</b>							
	MILL PVMT & SHLD 2.00"	100.00%	8,262	SQ YD	\$2.50	\$20,655	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	50	SQ YD	\$90.83	\$4,542	
	HMA OVERLAY PVMT 2.00"	100.00%	4,957	SQ YD	\$9.60	\$47,590	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,305	SQ YD	\$9.60	\$31,727	
	PWFn =	0.6419		PW =	0.6419 X	\$104,514	\$67,084
<b>YEAR 20</b>							
	LONG SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CNTR LINE JOINT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	RNDM / THRM CRACK R&S	50.00%	2,045	LIN FT	\$2.00	\$4,090	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$90.83	\$454	
	PWFn =	0.5537		PW =	0.5537 X	\$15,698	\$8,692
<b>YEAR 25</b>							
	LONG SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CNTR LINE JOINT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	RNDM / THRM CRACK R&S	50.00%	2,045	LIN FT	\$2.00	\$4,090	
	PD PVMT PATCH M&F SURF	0.50%	25	SQ YD	\$90.83	\$2,271	
	PWFn =	0.4776		PW =	0.4776 X	\$17,515	\$8,365
<b>HMA SD</b>							
<b>YEAR 30</b>							
	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	8,262	SQ YD	\$2.50	\$20,655	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	99	SQ YD	\$90.83	\$8,992	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	33	SQ YD	\$89.71	\$2,960	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,957	SQ YD	\$10.80	\$53,539	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,305	SQ YD	\$10.80	\$35,693	
	PWFn =	0.4120		PW =	0.4120 X	\$121,839	\$50,196
<b>YEAR 35</b>							
	LONG SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CNTR LINE JOINT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	RNDM / THRM CRACK R&S	50.00%	2,045	LIN FT	\$2.00	\$4,090	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$90.83	\$454	
	PWFn =	0.3554		PW =	0.3554 X	\$15,698	\$5,579
<b>YEAR 40</b>							
	LONG SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CNTR LINE JOINT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	RNDM / THRM CRACK R&S	50.00%	2,045	LIN FT	\$2.00	\$4,090	
	PD PVMT PATCH M&F SURF	0.50%	25	SQ YD	\$90.83	\$2,271	
	PWFn =	0.3066		PW =	0.3066 X	\$17,515	\$5,369
							\$171,859
ROUTINE MAINTENANCE ACTIVITY			0.70	Lane Miles	0.00	\$0	\$0
MAINTENANCE LIFE-CYCLE COST							\$171,859
45	YEAR LIFE CYCLE	CRFn = 0.0407852	MAINTENANCE ANNUAL COST PER MILE				\$19,908



**PCC PAVEMENT****JPCP**

ROUTE IL 31  
SECTION I-B-1  
COUNTY Kane  
LOCATION at Ferson Creek

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 1859 FT ==> 0.35 Miles  
# OF CENTERLINES 1 CL  
# OF LANES 2 LANES  
# OF EDGES 2 EP  
LANE WIDTH - AVERAGE 12 FT  
SHOULDER WIDTH PCC Inside 8 FT  
PCC Outside 8 FT

PAVEMENT THICKNESS (RIGID) JPCP 9.00 IN TIED SHLD  
SHOULDER THICKNESS 9.00 IN

POLICY OVERLAY THICKNESS 2.50 IN

RIGID PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
Worksheet Construction Type is Reconstruction		4.59	3.12	4.59
			The Pavement Type is	JPCP

**INITIAL COSTS**

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	( 9.00" )	4,957	SQ YD	\$43.25 / SQ YD	\$214,390
PAVEMENT REINFORCEMENT		0	SQ YD	\$0.00 / SQ YD	\$0
STABILIZED SUBBASE	( 4.50" )	5,577	SQ YD	\$15.00 / SQ YD	\$83,655
PCC SHOULDERS	( 9.00" to 9.00" )	3,305	SQ YD	\$38.25 / SQ YD	\$126,416
CURB & GUTTER		0	LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C	( ~ 2.18" )	88	TONS	\$25.00 / TON	\$2,200
IMPROVED SUBGRADE:	Aggregate / Width = 25.6	5,333	SQ YD	\$10.00 / SQ YD	\$53,330
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		4,957	SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		3,305	SQ YD	\$0.00 / SQ YD	\$0

Note: \* Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	\$479,991
RIGID CONSTRUCTION ANNUAL COST PER MILE	\$55,602

**MAINTENANCE COSTS:**

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 / LANE-MILE / YEAR
HMA POLICY OVERLAY	( 2.50" )		2.50
HMA POLICY OVERLAY PVMT	( 2.50" )	1.0087	2.50
HMA SURFACE MIX	( 1.50" )	1.0082	1.80
HMA BINDER MIX	( 1.00" )	1.0155	1.00
HMA POLICY OVERLAY SHLD	( 2.50" )		2.50
CLASS A PAVEMENT PATCHING			\$170.00 / SQ YD
CLASS B PAVEMENT PATCHING			\$130.00 / SQ YD
CLASS C SHOULDER PATCHING			\$110.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.42
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL			\$2.00 / LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL			\$2.00 / LIN FT
RANDOM CRACK ROUT & SEAL (100% Rehab = 100.00' / Station / Lane)			\$2.00 / LIN FT

RIGID TOTAL LIFE-CYCLE COST	\$574,013
RIGID TOTAL ANNUAL COST PER MILE	\$66,493



JOINTED PLAIN CONCRETE PAVEMENT  
UNBONDED JOINTED PLAIN CONCRETE OVERLAY  
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10							
	PAVEMENT PATCH CLASS B	0.10%	5	SQ YD	\$130.00	\$650	
	PWF <sub>n</sub> =	0.7441		PW =	0.7441 X	\$650	\$484
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	10	SQ YD	\$130.00	\$1,300	
	PWF <sub>n</sub> =	0.6419		PW =	0.6419 X	\$1,300	\$834
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	99	SQ YD	\$130.00	\$12,870	
	SHOULDER PATCH CLASS C	0.50%	17	SQ YD	\$110.00	\$1,870	
	LONGITUDINAL SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CENTERLINE JT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	PWF <sub>n</sub> =	0.5537		PW =	0.5537 X	\$25,894	\$14,337
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	149	SQ YD	\$130.00	\$19,370	
	SHOULDER PATCH CLASS C	1.00%	33	SQ YD	\$110.00	\$3,630	
	PWF <sub>n</sub> =	0.4776		PW =	0.4776 X	\$23,000	\$10,985
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	198	SQ YD	\$130.00	\$25,740	
	SHOULDER PATCH CLASS C	1.50%	50	SQ YD	\$110.00	\$5,500	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,957	SQ YD	\$12.00	\$59,488	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,305	SQ YD	\$12.00	\$39,659	
	PWF <sub>n</sub> =	0.4120		PW =	0.4120 X	\$130,387	\$53,718
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CENTERLINE JT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	RANDOM CRACK R&S	50.00%	1,859	LIN FT	\$2.00	\$3,718	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,190	LIN FT	\$2.00	\$2,380	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	5	SQ YD	\$93.49	\$467	
	PWF <sub>n</sub> =	0.3554		PW =	0.3554 X	\$17,719	\$6,297
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	25	SQ YD	\$130.00	\$3,250	
	LONGITUDINAL SHLD JT R&S	100.00%	3,718	LIN FT	\$2.00	\$7,436	
	CENTERLINE JT R&S	100.00%	1,859	LIN FT	\$2.00	\$3,718	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,786	LIN FT	\$2.00	\$3,572	
	RANDOM CRACK R&S	50.00%	1,859	LIN FT	\$2.00	\$3,718	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	25	SQ YD	\$93.49	\$2,337	
	PWF <sub>n</sub> =	0.3066		PW =	0.3066 X	\$24,031	\$7,367
							\$94,022
	ROUTINE MAINTENANCE ACTIVITY		0.70	Lane Miles	\$0.00	\$0	\$0
	MAINTENANCE LIFE-CYCLE COST						\$94,022
45	YEAR LIFE CYCLE	CRF <sub>n</sub> = 0.0407852	MAINTENANCE ANNUAL COST PER MILE				\$10,891



## LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 1/31/13 2:58 PM

CONSTRUCTION	INITIAL COST	PRESENT WORTH ANNUAL COST PER MILE	JPCP	HMA
			\$479,991 \$55,602	\$389,638 \$45,135
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$94,022 \$10,891	\$171,859 \$19,908
TOTAL	LIFE-CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$574,013 \$66,493	\$561,497 \$65,044

## LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	HMA	\$65,044	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	\$66,493	2.2%

P:\Pavement Design Stuff\ID-1\IL 31 over Ferson Creek 02-01-13\IDOT Mechanistic Pavement Design with LCCA\_10-11-12.xlsm]LifeCycleCost